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Teacher Training Module:

Mathematics

Learning Cycle 10

Information Handling

Sindh Technical Assistance – Development through Enhanced Education Programme (STA-DEEP)

STEDA

Provincial Institute of Teacher Education Sindh, Pakistan

Sukkur IBA University

THE AGA KHAN UNIVERSITY

Introduction and Rationale of the Training

Dear Teachers!

Welcome to the new phase of the Continuous Professional Development (CPD) Program. In the previous phase, we had focused on pedagogical skills that helped you to develop your skills to make classroom more interactive, participative, and joyful for our students. In the new phase, we will continue practicing those pedagogical skills and also learn about the introduced content knowledge and skills in Mathematics, Science, English, Urdu, and Sindhi. As a result, you will be better prepared to deal classroom situation using modern teaching strategies integrated with subject knowledge.

Our vision

Our common goal is to improve the quality of teaching in schools all over Sindh. We want students to become active and collaborative learners, problem solvers, and critical thinkers who approach tasks with creativity and confidence. They are conceptually clear about the subject content and have the skills to link this content with the world around them. To make this possible, we, as teachers, must be better prepared for the classroom demands in pedagogy and the subject content. Moreover, we aim to professionalize these trainings so that the CPD teacher training courses make an impact and substantially change student performance.

Our Teaching Philosophy

The CPD training sessions, including this training, follow a participatory teaching philosophy that engages participants to apply and practice active and collaborative learning, as well as engage in self and peer reflection to become community of practice. The objective is not only to improve the teaching practices but to help you understand the theory of the subject content and the strategies that help students apply the content in daily life with confidence and mastery.

Supporting You

The training module is designed to support you in your classroom teaching. It will introduce you to the subject content and some approaches for use in the classroom. This will make your teaching more manageable and help you grow as a skillful teacher.

Acknowledgement

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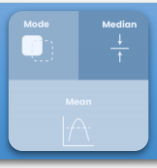
Information Handling

Learning Objectives: By the end of the session, the teachers will be able to:

discuss the importance and process of information handling;

organize and represent data using appropriate graph (bar graph, pie chart, line graph);

analyze and interpret data given in graphical representation;

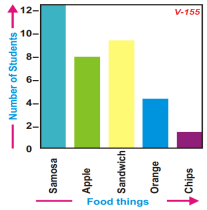
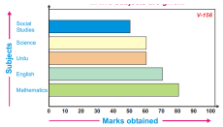


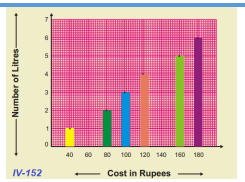
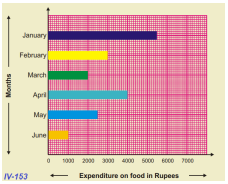
solve real life problems to calculate mean, median and mode.

Session Plan

Instructional strategies/activities

Time	Objective/purpose of the activity	Activities/learning experiences	Materials/resources
 30 mins	**Pictorial/Bar graph**	**Activity 1:** 1. Provide a sticky note to each teacher to write the name of their favourite game/sport 2. On the board, ask teachers to paste sticky notes to form a pictorial/bar graph 3. Discuss various questions to interpret bar graphs such as a. How many teachers have chosen cricket as their favourite sport? b. How many more teachers like basketball than cricket? 4. Pose a question, if the number of teachers increases up to thousands, do you think that it will be effective to use a bar graph? 5. Generate the discussion around the use of scaling in the graphical representation 6. Conclude the activity by discussing the use of scale for optimizing data visualization **Activity 2: (Plotting graph using graph paper)** 1. Ask teachers to suppose the number of games selected by a group where each category is 20 times more than the data collected in the class 2. Select the appropriate scale 3. Use graph paper to plot the bar graph	Sticky notes Graph paper

		4. Ask teachers to explain their scale and graphs to the whole class 5. Conclude the activity by highlighting the effective use of scale and graph paper.	
10 mins	**Data handling process/cycle**	1. Ask teachers to refer to handout-1a related to the terms of the data handling cycle and arrange them in order with reference to the data handling process 2. Collect the responses 3. Conclude by discussing the data handling cycle (refer to handout-1b for facilitator's input)	Handout-1a Handout-1b (For facilitator's input)
35 mins	**Identifying the sources of data in relation to the information handling cycle.**	1. Provide teachers with different graphs handout -2 e.g. **Group-A:** Break time food preference (grade-V) **Group-B:** Marks obtained by Yasir (grade-V) **Group-C:** Cost of Squash (grade-IV) **Group-D:** Expenditure of a Family on Food (grade-IV) 2. Ask teachers to discuss in their respective group and write answers to the following questions: • What stage of information handling does the given graph pertain to? • How this data was collected? • In which other ways given information can be presented? • How this information will be helpful for different persons? (e.g., parent, teacher, head teacher, doctors etc). • Prepare a list of questions that may be answered using these graphs.	Graph Papers, Strips, Pencils, Scale, Pencils, Markers  (a) Break time food  (b) Marks Obtained

		• Draw at least one most appropriate conclusion from the given information. 3. Ask teachers to share their responses with the whole class	 (c) Cost of Squash  (d) Food expenditure
45 mins	**Construction of pie chart**	1. Ask teachers to identify a context from their own daily life experience, such as, a) Spent time in 24 hours b) Expenditure for a week c) Weekly intake of different fruits 2. Design a question 3. Collect and plot the data on a table and construct a pie chart. 4. Ask teachers to display their pie chart and explain the process to the whole class	Chart paper and geometry box
20 mins	**Solve real-life problems to calculate mean, median and mode.**	**Think-Pair-Share** 1. Ask teachers to identify real-life context where the following measures of central tendency are appropriate a. Arithmetic mean/Average	Handout-3a (Facilitator's Input) Handout-3b

		b. Median c. Mode 2. Share your responses with the person sitting next to you 4. Collect responses and discuss the real-life use of various measures of central tendency (Refer to Handout-3a for facilitator's Input) **Pair Activity:** 1. Ask teachers to complete the task given in Handout-3b 2. Collect a few responses and conclude the activity by highlighting the purpose of the different measures of central tendency.	
 30 mins	**Textbook alignment: Application of Information handling cycle on the Textbook exercises**	**Group work** 1. Divide teachers into six groups 2. Assign each group a grade level from 3 to 8 3. Ask teachers to explore the chapter of information handling of that particular assigned grade level in their respective groups. 4. List down the concepts of information handling covered in that particular chapter, align them with concepts discussed in the session and identify the concepts not covered in the discussion 5. Discuss different strategies, methods and resources for teaching Area and Perimeter in their respective classrooms 6. Present the ideas to the whole class	5 set of Grade 3 to 8 textbooks/e-textbooks Link: https://ebooks.stbb.edu.pk/
 10 mins	**Reflection**	Invite teachers to share their learning experience during the session with the whole class (refer to the reflection question)	

Handout-1a

Instructions: Arrange in order the following processes of the information handling cycle

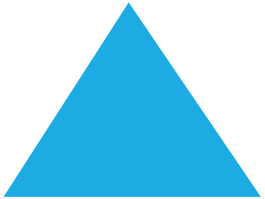
ANALYZING

ORGANIZING & PRESENTING

DISCUSSING & CONCLUSION

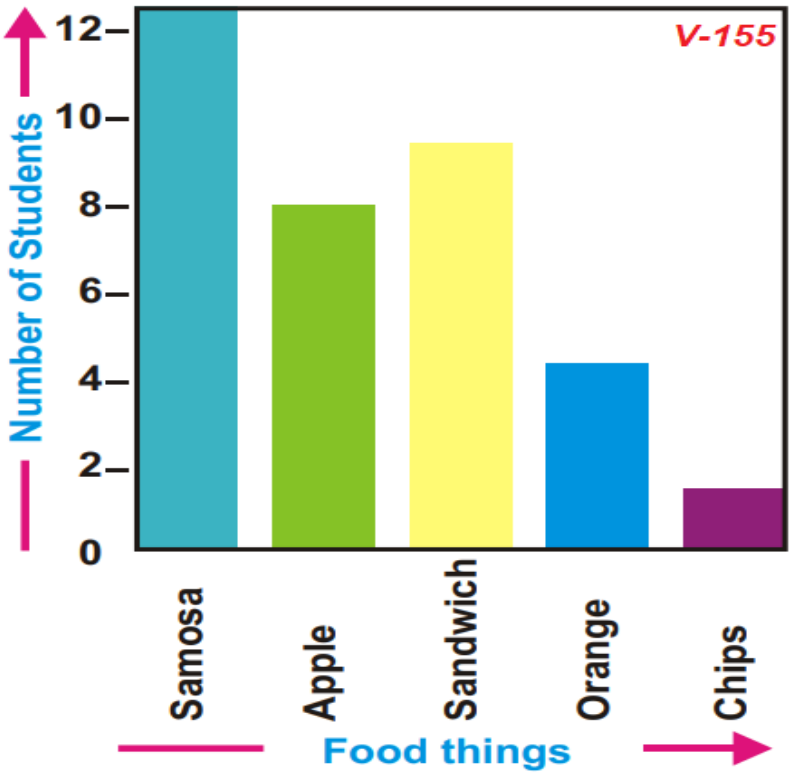
COLLECTING DATA INFORMATION

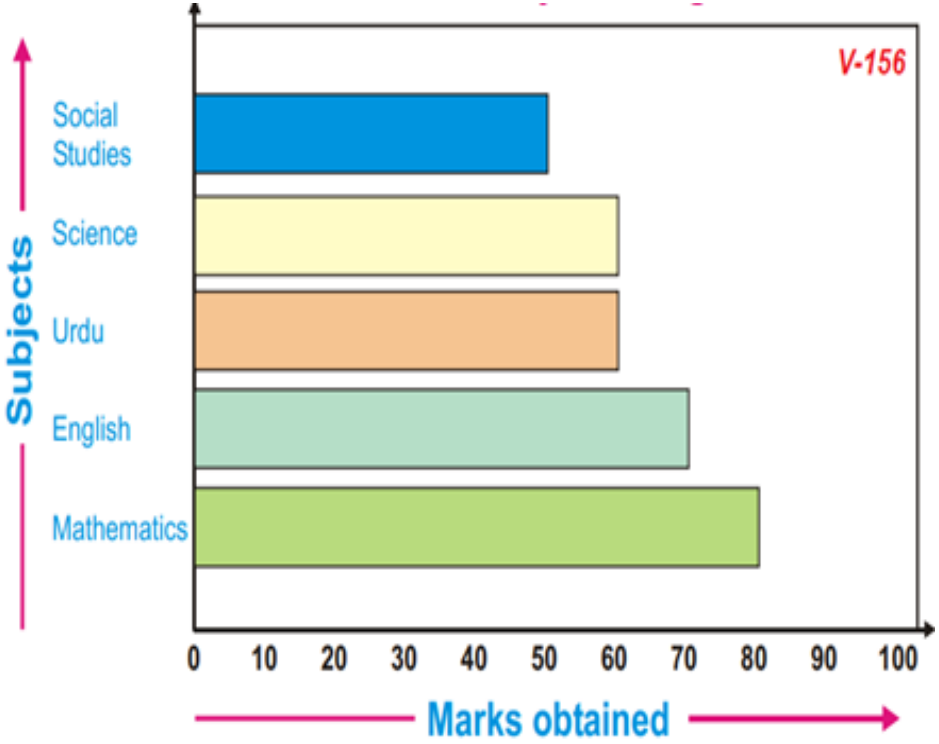
PLANNING FRAMING HYPOTHESIS & QUESTION

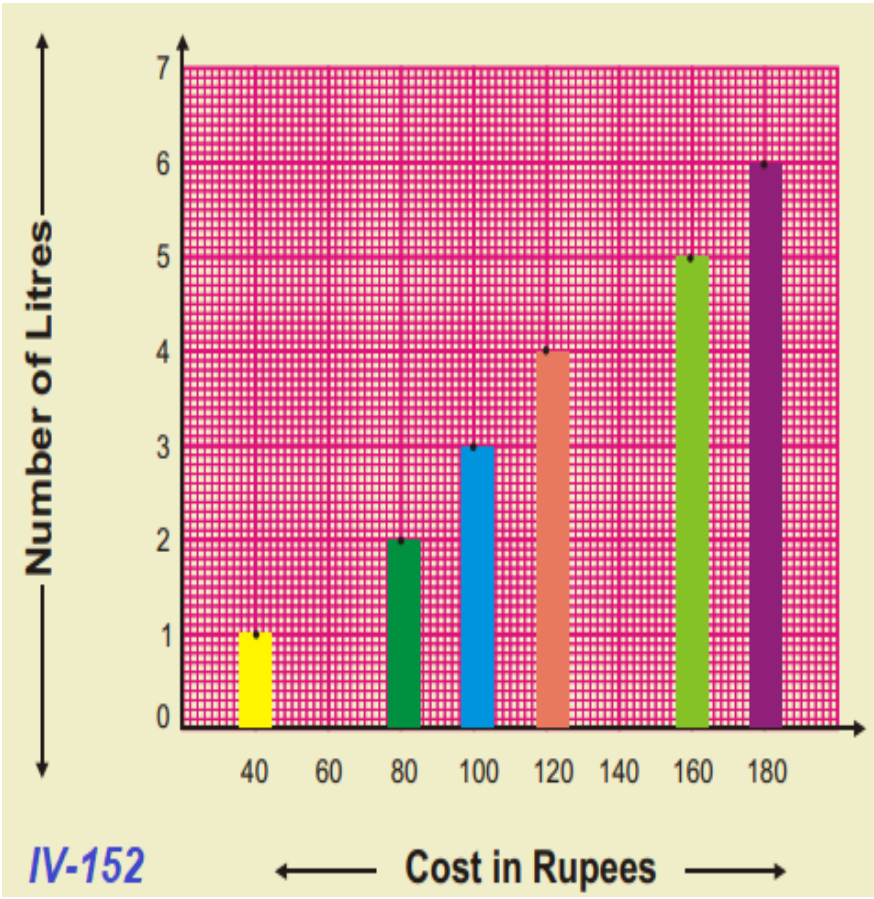


Handout 1b: (Facilitator's Input)

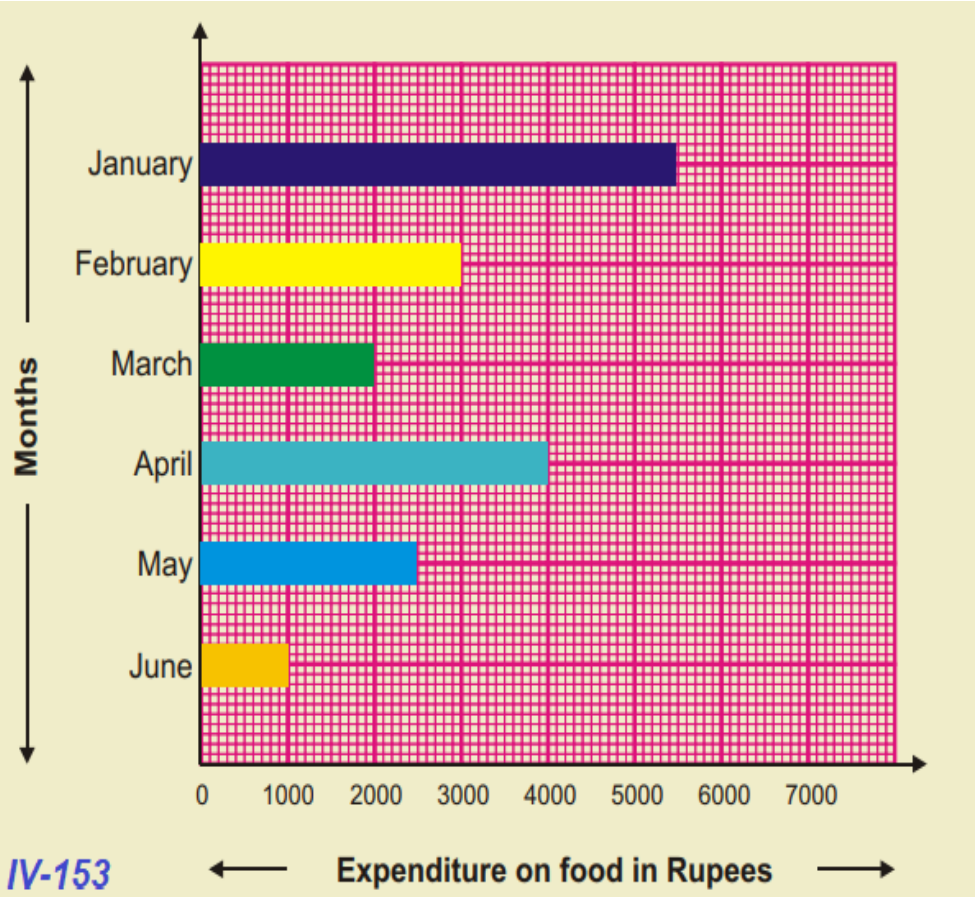
Handout 2


V-155
Number of Students
12
10
8
6
4
2
0
Samosa
Apple
Sandwich
Orange
Chips
Food things


V-156
Subjects
Social Studies
Science
Urdu
English
Mathematics
0
10
20
30
40
50
60
70
80
90
100
Marks obtained


Number of Litres
7
6
5
4
3
2
1
0
40
60
80
100
120
140
160
180
Cost in Rupees

IV-152


Months
January
February
March
April
May
June
0
1000
2000
3000
4000
5000
6000
7000
Expenditure on food in Rupees

IV-153

Handout-3a

Reference: https://www.quora.com/What-is-the-real-life-example-of-mean-median-and-mode-1

Handout-2a (facilitator's Input)

Here are some real-life examples of mean, median, and mode:

Mean:
The mean is the average of a set of numbers. For example, if you have a list of test scores for a class, you can calculate the mean score by adding up all the scores and dividing by the total number of students. So, if you have test scores of 80, 85, 90, 95, and 100, the mean score would be (80+85+90+95+100)/5 = 90.

Median:
The median is the middle number in a set of numbers when they are arranged in order. For example, if you have a list of salaries for a company, you can find the median salary by arranging the salaries from lowest to highest and then finding the middle salary. So, if the salaries are Rs 30,000, Rs 35,000, Rs 40,000, Rs 45,000, and Rs 50,000, the median salary would be Rs 40,000.

Mode:
The mode is the number that appears most frequently in a set of numbers. For example, if you have a list of shoe sizes for a group of people, you can find the mode by identifying the shoe size that appears most often. So, if the shoe sizes are 8, 9, 9, 10, 11, and 12, the mode shoe size would be 9.
that
Now let's consider the example below

Consider the case of a food Center having 9 similar eateries. Assume that a lunch for a person costs – say 60, 50, 70, 90, 80, 100, 80, 120, 110 rupees. A few hundred meters away from these eateries, there lies a posh hotel those charges - say Rs.500 per lunch. Now, what is the average cost of lunch for one person - in this locality? Average cost -> Arithmetic mean, or, simply mean would be:

(60+50+70+...+110+500)/10.0 --> 1260/10 --> 126.

If you have to find the median price, you have to sort the price in ascending order - 50, 60, 70, 80, 80, 90, 100, 110, 120, 500; Then, find the middle item - 6th item - 90 would be your median.

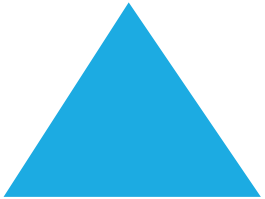
For mode, the item with the maximum frequency would be your mode. Here, it would be 80. It is totally possible that there could be more than one mode in a data set.

Now, for the interpretation part:

From the values of mean and median, is it okay to say that the average cost of lunch is Rs. 126. Here 126 is much more than the 9th item in the list. If you take the median here, we could say that the median price of food in the locality is Rs. 90 - which means there are an equal number of observations to both the left and right of 90 (above and below). This gives a feeling that the median cost/lunch is not as bad as observed through the mean.

Extension: What is happening here?

Mean is sensitive to extreme observations. Data point: 500 is an outlier, and it skews the entire data set. However, in case of median, it is totally resistant to extreme observations. All it matters in Median, is each number's relative standing with respect to the Median. In this example, Median would be the right choice for 'central tendency' and not 'mean'.



Handout-3b

Instructions:

1. Make at least 3 real-life problems for mean, median and mode.
2. Exchange your problem with your partner.
3. Calculate the mean, median and mode. Also, write an interpretation of each calculated mean, median and mode.